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(54) **UNIT AND METHOD FOR CHECKING THE INTEGRITY OF FLAVOURING CAPSULES IN SMOKING ARTICLES**

(57) Described are a unit (1) and a method for checking the integrity of flavouring capsules in rod-shaped smoking articles (100). The unit (1) comprises a conveying drum (10) configured to convey a succession of rod-shaped articles (100) transversely along a conveying path (L) passing through an inspection area, a blowing device (20) located in the inspection area and configured to deliver a jet or puff of air into a first end (101) of at least some of the articles (100) in transit through the inspection

area, and a detector (30), located in the inspection area on a second side of the conveying drum (10), opposite the first side, and configured to analyse at least one chemical and/or physical property of the air flow. The unit (1) also comprises at least a first shutter (50) associated with the inlet opening (32) of the detector (30) and configured to produce an alternating succession of open and closed configurations of the inlet opening during the operation of the unit (1).

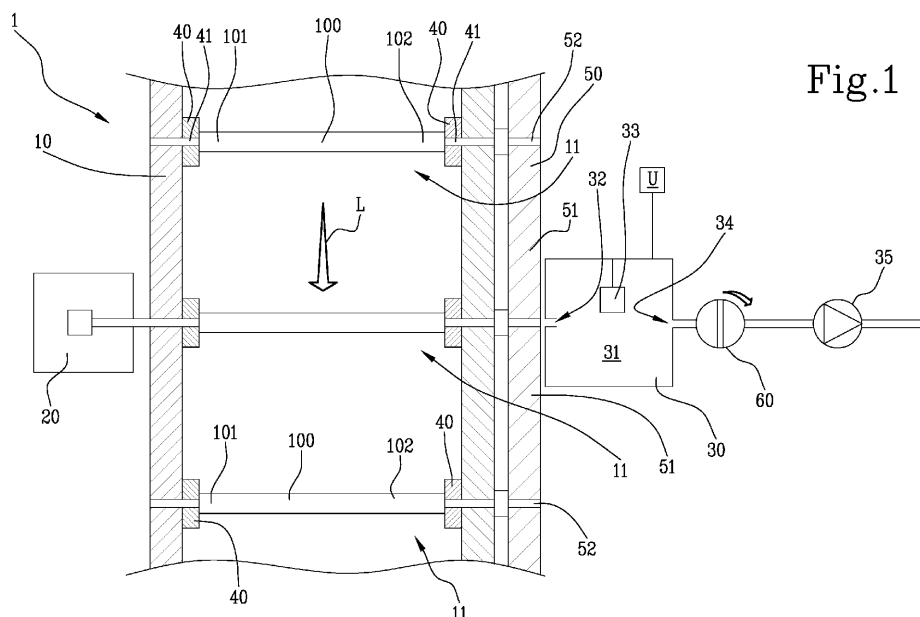


Fig.1

Description

[0001] This invention addresses the tobacco industry and relates to a unit and a method for checking the integrity of flavouring capsules in rod-shaped smoking articles.

[0002] In the field relevant to this invention, the prior art teaches that a wide range of flavours for smoking articles can be obtained by embedding a flavouring capsule in the filter of the smoking article. The capsule typically consists of a flavouring liquid enclosed in a seamless cover: the cover is made in such a way as to break easily when the capsule is squeezed. In other words, the cover breaks when a certain pressure is applied to it, allowing the flavouring liquid to impregnate the filter. On account of the fragility of the cover, however, the capsules are easily damaged during the process of manufacturing the smoking articles.

[0003] Known in the prior art, therefore, are a number of different devices for inspecting the integrity of flavouring capsules after they have been placed in the smoking articles.

[0004] Some inspection devices, for example, have olfactory sensors configured to analyse a gas flow made to pass through the smoking article containing the flavouring capsule so as to check the integrity of the capsule by measuring the concentration of the flavouring in the gas flow.

[0005] A solution of this kind is known from patent application WO2021/070302. In that solution, the device comprises a conveying drum configured to convey a succession of rod-shaped articles transversely along a conveying path by way of an inspection area where a jet of air generated at a first end of each article when the article passes through the inspection area flows out through the opposite end of the article to reach an inspection chamber. An olfactory sensor located in the inspection chamber is connected to a control unit and is configured to analyse the air jet to measure the concentration of flavouring in the air jet. If the concentration of the flavouring exceeds a certain threshold, the control unit runs a rejection routine to discard the defective smoking article.

[0006] The Applicant has found that the structural and functional aspects of that solution can be improved. In effect, the disadvantage of that solution is that it does not ensure optimum analysis of the air flow sample. The air flow collected in the inspection chamber is substantially in communication with the space outside the inspection chamber. As a result, the air sample to be analysed is subject to pressure pulses caused by the movement of the conveying drum which means that the air to be analysed in the inspection chamber does not remain correctly motionless. For example, on account of the movement of the conveying drum and the intrinsic speed of operations, part of the air sample is "sucked out" through the inlet opening and/or may be partly replaced by another air flow. The higher the feed speed of the articles, the more marked this problem is. The air sample to be ana-

lysed may also be contaminated by an air flow from the next article or by air left over from the previous sample analysed. Indeed, it should be noted that the time required for inspection to be carried out correctly depends on the type of sensor used and thus, when production speed is high, the transient times for blowing air in and removing it may be inadequate for inspection to be carried out correctly and, in particular, reliably enough.

[0007] Such operating conditions, therefore may result in the sensor producing inaccurate results, leading to its rejecting good articles and/or not detecting defective articles.

[0008] In this context, the basic technical purpose of this invention is to provide a unit and a method for checking the integrity of flavouring capsules in rod-shaped smoking articles to overcome the above mentioned disadvantages of the prior art.

[0009] In particular, the aim of this invention is to provide a unit and a method for checking the integrity of flavouring capsules in rod-shaped smoking articles and capable of ensuring an optimum level of reliability in the detection of a defective article.

[0010] Another aim of this invention is to provide a unit and a method for checking the integrity of flavouring capsules in rod-shaped smoking articles and which are optimized for high speeds.

[0011] The technical purpose indicated and the aims specified are thus achieved by a unit and a method for checking the integrity of flavouring capsules in rod-shaped smoking articles, comprising the technical features described in claims 1 and 15, respectively, and/or in one or more of the claims dependent thereon.

[0012] The invention is described below with reference to the accompanying drawings, which illustrate a non-limiting embodiment of it, in which:

- Figure 1 shows a schematic view of a preferred embodiment of a unit for checking the integrity of flavouring capsules in rod-shaped smoking articles according to this invention, in a first operating configuration;
- Figure 2 shows a schematic view of the unit of Figure 1 in a second operating configuration;
- Figure 3 shows a schematic view of the unit of Figure 1 in a third operating configuration.

[0013] The numeral 1 in the accompanying drawings denotes in its entirety a unit (represented schematically and only partly in the accompanying drawings) for checking the integrity of flavouring capsules in rod-shaped smoking articles, denoted by the reference numeral 100.

[0014] In this disclosure, the term "smoking articles" is used broadly to mean finished products such as, for example, traditional cigarettes, HEETS or cigars, but also semi-finished products of the tobacco industry such as filters, for example, where these need to be inspected before final assembly of the finished product.

[0015] As shown in the drawings, the unit 1 comprises

a conveying drum 10, a blowing device 20 and a detector 30.

[0016] The conveying drum 10, whose structure is known in the prior art, is configured to convey a succession of rod-shaped smoking articles 100 transversely along a conveying path L which passes through an inspection area. The conveying drum 10 is rotatable about an axis of rotation and comprises a plurality of receiving seats 11 which are angularly distributed around the axis of rotation to accommodate respective articles 100. Preferably, the receiving seats 11 are distributed angularly around the axis of rotation of the drum 10 at a position such as to be equidistant at a certain, constant spacing.

[0017] Preferably, the unit 1 comprises retaining means 40, configured for securely holding each article 100 at its ends 101, 102 at least in the inspection area. The retaining means 40 comprise, for each receiving seat 11, a pair of opposing pads movable around the axis of rotation of the drum 10 and synchronized with the drum 10, configured to gradually engage the ends of the article 100 as it approaches the inspection area and to gradually disengage the ends 101, 102 of the article 100 as it moves away from the inspection area. In particular, each pad has a through duct 41 and the through ducts 41 of each pair are aligned with each other and positioned, when in the inspection area, to be aligned with the blowing device 20 and with the detector 30. In other words, at a functional level, each article 100 is held securely at its ends 101, 102 at least in the inspection area by a pair of opposing pads, movable around the axis of rotation of the drum 10 and synchronized with the drum 10. The pads gradually engage the ends 101, 102 of the article 100 as it approaches the inspection area and gradually disengage the ends 101, 102 of the article 100 as it moves away from the inspection area. For this purpose, the pads are carried by, or form part of, respective opposite rings or discs (called "swash rings" or "swash plates", which are disposed on opposite sides of the drum 10 and whose axes of rotation are slightly inclined in a known way relative to the axis of rotation of the drum 10, so that each pad, as it rotates, also moves axially relative to the receiving seat 11 between a position where the article 100 is engaged and a position where it is disengaged.

[0018] The blowing device is 20 located in the inspection area on a first side of the conveying drum 10: the blowing device 20 is configured to deliver a jet or puff of air into a first end 101 of at least some of the articles 100 when the articles 100 positioned on the drum 10 pass through the inspection area. In other words, the blowing device 20 is configured to deliver a jet or puff of air at a pressure suitable for it to traverse the article 100 longitudinally from the first end 101 to the second end 102, generating an air flow, when the article 100 is aligned with the blowing device 20. This air flow, in the case of filter cigarettes, is concordant with the normal direction of the air when the smoker inhales.

[0019] The detector 30 is located in the inspection area on a second side, opposite the first side, of the conveying

drum 10. Structurally, the detector 30 has an inspection chamber 31 and an inlet opening 32, facing and aligned with the blowing device 20, to receive the air flowing out of the second end 102 of each article 100 and generated by the jet or puff of air. The inlet opening 32 allows the air flow to be conveyed into the inspection chamber 31. The detector 30 also comprises an olfactory sensor 33 located in the inspection chamber 31 and configured to analyse at least one chemical and/or physical property of the air flow.

[0020] The unit 1 also comprises a control unit U, connected at least to the olfactory sensor 33 and configured at least to receive and process the measurements made by the olfactory sensor 33.

[0021] The blowing device 20 and the detector 30 are preferably stationary. In other words, the blowing device 20 and the detector 30 are mounted on respective supports so they are fixed along the conveying path L of the articles 100.

[0022] According to an advantageous aspect of this invention, the inspection chamber 31 comprises at least a first shutter 50 associated with the inlet opening 32 and configured to produce an alternating succession of open and closed configurations of the inlet opening 32 during the operation of the unit 1. Preferably, the first shutter 50 adopts an open configuration at least during the generation of the jet or puff of air, and adopts a closed configuration during at least part of the detecting process performed by the olfactory sensor 33.

[0023] At a functional level, when the article 100 moves along the conveying path L and aligns with the blowing device 20, the latter delivers the jet or puff of air into the first end 101 of the article 100. The air flow traverses the article and, as it exits through the second end 102, is conveyed through the inlet opening 32 into the inspection chamber 31 and collected therein. At this point, the inlet opening 32 is occluded by the first shutter 50, thereby trapping the air flow inside the inspection chamber 31. Preferably, the inlet opening 32 is kept open in the step of collecting the air flow collected and kept closed in the step of analysing the air flow collected. With the olfactory sensor 33, the detector 30 therefore analyses at least one chemical and/or physical property of the air flow collected in the inspection chamber 31 to measure the concentration of the flavouring in the air flow, thus checking the integrity of the flavouring capsule. Once the air flow collected has been analysed, the inlet opening 32 of the inspection chamber 31 is re-opened. The inlet opening 32 is therefore subjected to at least one open/close cycle between the step of analysing the air flow from one article 100 and the step of analysing the air flow from the next article 100.

[0024] Advantageously, the presence of the first shutter 50 allows the air flow sample to be isolated from the surrounding external space, and in particular, from the space in which the conveying drum 10 is located. In other words, the presence of the first shutter 50 allows the air sample to be "captured" at least for the length of time

necessary for it to be analysed. This technical feature, therefore, ensures that the air sample is not diluted or extracted from the inspection chamber 31 and keeps its composition unchanged.

[0025] According to an advantageous aspect of this invention, the detector 30 also comprises an outlet opening 34. Preferably, the outlet opening 34 is used to make the air flow out of the inspection chamber 31. Advantageously, this technical feature allows the air flow which has already been analysed to be expelled through an opening which is distinct from the inlet opening 31.

[0026] In effect, according to an advantageous aspect of the invention, there is a step of discharging the analysed air flow from the outlet opening 31. Preferably, the step of discharging is carried out by expelling the analysed air flow through the aforesaid discharge opening 34. Still more preferably, the step of discharging is carried out after analysing the air flow and before or at the same time as another air flow is collected for analysis.

[0027] According to an advantageous aspect of this invention, the detector 30 comprises an air extraction device 35 associated with the inspection chamber and configured to expel the air from the inspection chamber 31 through the outlet opening 34.

[0028] In an embodiment, as illustrated in Figure 1, the air extraction device 35 comprises a suction device connected to the outlet opening 34. In other words, the step of discharging the air flow from the inspection chamber 31 may be carried out by suction applied through the outlet opening 34.

[0029] In another, different embodiment, not illustrated, the air extraction device 35 comprises a nozzle connected to the inspection chamber 31 to cause a jet or puff of pressurized cleaning air to be introduced into the inspection chamber 31. In other words, the step of discharging the air flow from the inspection chamber 31 may be carried out by negative pressure applied through the outlet opening 34 by means of a jet or puff of pressurized cleaning air delivered into the inspection chamber 31.

[0030] Advantageously, the air extraction device 35, of whatever kind, ensures that the air flow that has already been analysed is correctly removed so it does not negatively influence the analysis of the air flow after it. According to an advantageous aspect of this invention, the inspection chamber 31 comprises a second shutter 60 associated with the outlet opening 34 and configured to produce an alternating succession of open and closed configurations of the outlet opening 34 during the operation of the unit 1. Preferably, the outlet opening 34 is subjected to at least one open/close cycle between the step of analysing the air flow from one article 100 and the step of analysing the air flow from the next article 100. Still more preferably, the second shutter 60 adopts an open configuration at least during the generation of the jet or puff of cleaning air, and adopts a closed configuration during at least part of the detecting process performed by the olfactory sensor 33 and, preferably while the air flow is entering the inspection chamber 31.

[0031] Advantageously, the presence of the second shutter 60 allows the air flow sample to be isolated from the surrounding external space, and in particular, from the external space to the outlet opening 34. This technical feature, therefore, ensures that the air flow does not flow out through the outlet opening 34 accidentally before detection is completed by the olfactory sensor 33.

[0032] In use, in a configuration of alignment between an article 100 and the blowing device 20, the inlet opening 32 is kept open while the outlet opening 34 is closed. Thus, the air flow emitted by the article 100 reaches the inspection chamber 31 and remains confined therein (Figure 1).

[0033] Next, the inlet opening 32 is closed and the outlet opening 34 remains closed. The air thus remains trapped inside the inspection chamber 31, allowing the olfactory sensor 33 to perform detection (Figure 2). During this step, the article 100 continuously moving forward, out of alignment with the blowing device 20.

[0034] Next, at the end of the step of detecting and when the next article approaches the inspection area, the outlet opening 34 is opened to allow air to be expelled from the inspection chamber 31 (Figure 3). At the same time, or after that, the inlet opening 32 is opened and the outlet opening 34 is closed to allow the next article to be inspected.

[0035] Described below in detail are two possible, exemplary hence non-limiting embodiments of the shutters 50 and 60.

[0036] Preferably, the first shutter 50 is of an automatic type and synchronized mechanically with the conveying drum 10.

[0037] Also, in the embodiment illustrated, the second shutter 60 is of an electronically controlled type, as will become clearer as this description continues.

[0038] Alternatively, the first and second shutters 50, 60 may be of the same type (in particular, both automatic and synchronized mechanically with the conveying drum 10 or both of the electronically controlled type).

[0039] The first shutter 50 is configured to adopt the open and closed configurations in an automatic, sequential manner, synchronized with the movement of the conveying drum 10. In other words, opening and closing the inlet opening 31 is synchronized, in particular automatically and/or mechanically by rotating the drum 10 in such a way that the rate at which they open and close is the same as the rate at which the successive articles 100 pass through on the drum 10.

[0040] The shutter 50 is a rotary shutter and is preferably operated at a constant speed of rotation.

[0041] Structurally, the shutter 50 has at least one shutting portion 51 which is movable cyclically along a closed path defined by a respective axis of rotation and at least one through gap 52 which is movable cyclically along the closed path alternately with the shutting portion 51.

[0042] The shutter 50 may be made in the form of a disc or a ring (as illustrated in the accompanying drawings). In this solution, the through gaps 52 are through

holes which are angularly distributed on a peripheral portion of the shutter 50. Further, the shutting portions 51 are defined by the walls of the shutter 50 which, when the through gaps 52 and the inlet opening 32 are out of alignment, occlude the inlet opening.

[0043] Preferably, the axis of rotation of the shutter 50 substantially coincides with the axis of rotation of the drum 10 and the shutter 50 is moved in synchrony with the drum 10. In other words, the shutter 50 is rotatable about its own axis of rotation, which coincides with the axis of rotation of the conveying drum 10, at a constant speed which is synchronized with that of the conveying drum 10. In this embodiment, the speed of the shutter 50 is substantially equal to the speed of the conveying drum 10 and the through gaps 52 are arranged on the peripheral portion so as to substantially reflect the arrangement of the receiving seats 11 of the drum 10 and of the respective inlet opening 32.

[0044] Preferably, also, independently of its structure, the shutter 50 comprises sealing elements so it adheres by sliding contact to the outside wall of the detector 30 and sealedly occludes the respective inlet opening 32.

[0045] The second shutter 60 is defined by a controlled open/close valve, in particular, a valve with a rotary shutting element. In other words, opening and closing of the outlet opening 34 is determined by the angular position adopted by a rotary shutting element of the valve, where the rotary shutting element rotates continuously in the same rotation direction, creating a succession of controlled open and closed configurations at a rate determined directly by the angular rotation speed. The rotation speed of the rotary shutting element is controllable electronically so as to actively adjust the rate of the open and closed configurations, in particular in a manner corresponding to the rate at which the articles 100 pass through the inspection area.

[0046] In particular, the shutter 60 is connected to the control unit U which manages its operation in synchrony with the drum 10.

[0047] In variant embodiments not illustrated, one or both of the shutter 50, 60 may be electrovalves, where each opening action is electronically controlled.

[0048] The invention achieves the above-mentioned aims by eliminating the drawbacks of the prior art: in this regard, it should be noted that the structure of the unit 1, and in particular, of the detector 30, as claimed and/or described herein, is suitable for optimizing detection efficiency and accuracy.

[0049] This result is achieved by controlling the (open/closed) state of the inlet opening 32 and/or of the outlet opening 34 so that the olfactory sensor can operate under uniform conditions, without the air flow being diluted and/or contaminated.

Claims

1. A unit (1) for checking the integrity of flavouring cap-

sules in rod-shaped smoking articles (100), comprising:

- a conveying drum (10) configured to convey a succession of rod-shaped articles (100) transversely along a conveying path (L) passing through an inspection area; the conveying drum (10) being rotatable about an axis of rotation and comprising a plurality of receiving seats (11) angularly distributed around the axis of rotation to accommodate respective articles (100);
- a blowing device (20) located in the inspection area on a first side of the conveying drum (10); the blowing device (20) being configured to deliver a jet or puff of air into a first end (101) of at least some of the articles (100) when the articles (100) positioned on the drum (10) pass through the inspection area;
- a detector (30), located in the inspection area on a second side of the conveying drum (10), opposite the first side, and provided with an inspection chamber (31) and an inlet opening (32) facing and aligned with the blowing device (20) to receive an air flow coming out of the second end (102) of the articles (100), generated by the jet or puff of air and to convey the air flow into the inspection chamber (31), wherein the detector (30) also comprises an olfactory sensor (33) located in the inspection chamber (31) and configured to analyse at least one chemical and/or physical property of the air flow;

characterized in that the inspection chamber (31) comprises at least a first shutter (50) associated with the inlet opening (32) and configured to produce an alternating succession of open and closed configurations of the inlet opening (32) during the operation of the unit (1).

2. The unit (1) according to claim 1, wherein the first shutter (50) adopts an open configuration at least during the generation of the jet or puff of air, and adopts a closed configuration during at least part of the detecting process performed by the olfactory sensor (33).
3. The unit (1) according to claim 1 or 2, wherein the blowing device (20) and the detector (30) are fixed.
4. The unit (1) according to any one of the preceding claims, wherein the detector (30) also comprises an outlet opening (34) to allow air to flow out of the inspection chamber (31).
5. The unit (1) according to claim 4, wherein the detector (30) also comprises an air extraction device (35) associated with the inspection chamber (31) and configured to expel the air from the inspection cham-

ber (31) through the outlet opening (34).

6. The unit (1) according to claim 5, wherein the air extraction device (35) comprises a suction device connected to the outlet opening (34) or a nozzle connected to the inspection chamber (31) to cause a jet or puff of pressurized cleaning air to be introduced into the inspection chamber (31). 5
7. The unit (1) according to any one of claims 4 to 6, wherein the inspection chamber (31) comprises a second shutter (60) associated with the outlet opening (34) and configured to produce an alternating succession of open and closed configurations of the outlet opening (34) during the operation of the unit (1). 10
8. The unit (1) according to claim 7, when dependent on claim 5 or 6, wherein the second shutter (60) adopts an open configuration at least during the generation of the jet or puff of cleaning air, and adopts a closed configuration during at least part of the detecting process performed by the olfactory sensor (33). 15 20
9. The unit (1) according to any one of the preceding claims, wherein the shutter (50, 60) is configured to adopt the open and closed configurations in an automatic, sequential manner, synchronized with the movement of the conveying drum (10). 25 30
10. The unit (1) according to any one of the preceding claims, wherein the shutter (50, 60) is a rotary shutter and is preferably operated at a constant speed of rotation. 35
11. The unit (1) according to claim 10, wherein the shutter (50, 60) has at least one shutting portion (51) which is movable cyclically along a closed path defined by a respective axis of rotation and at least one through gap (52) which is movable cyclically along the closed path alternately with the shutting portion (51), the shutter (50, 60) being preferably made in the form of a disc or a ball. 40 45
12. The unit (1) according to claim 11, wherein the shutter (50) is the first shutter (50) and the axis of rotation of the shutter substantially coincides with the axis of rotation of the drum (10) and wherein the shutter (50) is moved in synchrony with the drum (10). 50
13. The unit (1) according to any one of claims 1 to 8, wherein the shutter (50, 60) is defined by a controlled open/close valve. 55
14. The unit (1) according to any one of the preceding claims, further comprising retaining means (40), configured for securely holding each article (100) at its

ends (101, 102) at least in the inspection area, the retaining means (40) comprising, for each receiving seat, a pair of opposing pads movable around the axis of rotation of the drum (10) and synchronized with the drum (10), configured to gradually engage the ends (101, 102) of the article (100) as it approaches the inspection area and to gradually disengage the ends (101, 102) of the article (100) as it moves away from the inspection area, each pad having a through duct (41) and the through ducts (41) of each pair being aligned with each other and positioned, when in the inspection area, to be aligned with the blowing device (20) and with the detector (30).

15. A method for checking the integrity of flavouring capsules in rod-shaped smoking articles (100), in particular implemented by an inspection unit (1) according to any one of the preceding claims, comprising the following steps:

- conveying a succession of rod-shaped articles (100) via a conveying drum (10) transversely along a conveying path (L) passing through an inspection area;
- in the inspection area, delivering a jet or puff of air into a first end (101) of at least some of the articles (100) when the articles (100) positioned on the drum (10) pass through the inspection area;
- collecting the air flow coming out of the second end (102) of the articles (100), generated by the jet or puff of air, flowing into an inspection chamber (31) through an inlet opening (32) of the inspection chamber (31);
- analysing at least one chemical and/or physical property of the air flow collected in the inspection chamber (31) by means of an olfactory sensor (33) located in the inspection chamber (31);

characterized in that the inlet opening (32) is subjected to at least one open/close cycle between the step of analysing the air flow from one article (100) and the step of analysing the air flow from the next article (100).

16. The method according to claim 15, wherein in the step of collecting the air flow, the inlet opening (32) is kept open, and in the step of analysing the air flow collected, the inlet opening (32) is kept closed.
17. The method according to claim 15 or 16, wherein the step of delivering a jet or puff of air into a first end (101) of at least some of the articles (100) is carried out by a blowing device (20) and wherein the blowing device (20) and the detector (30) are fixed.
18. The method according to any one of claims 15 to 17, further comprising a step of discharging the air flow

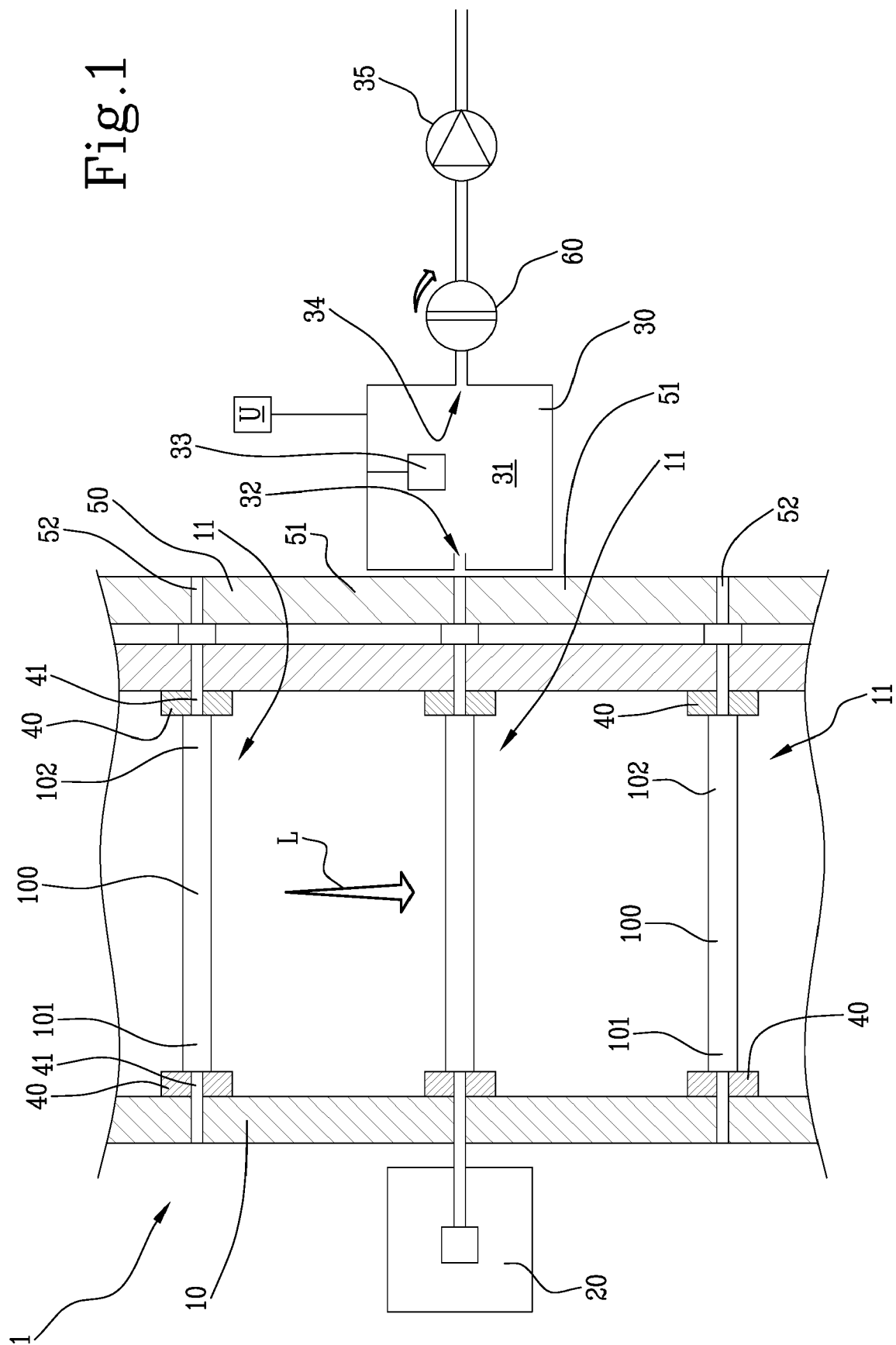
from the inspection chamber (31), in particular by an air compressing action through an outlet opening (34) to expel the air from the inspection chamber (31).

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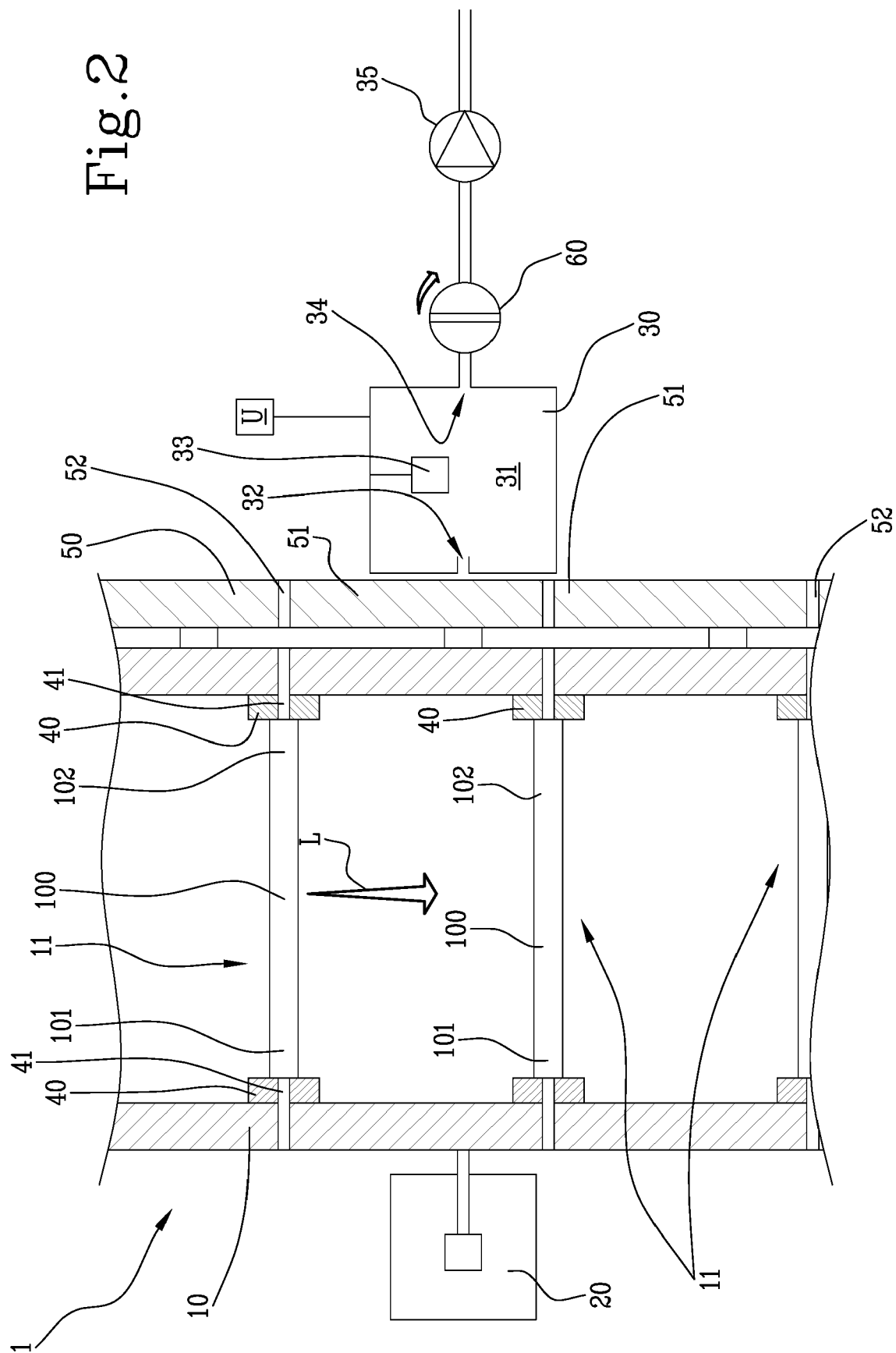
19. The method according to claim 18, wherein the step of discharging the air flow from the inspection chamber (31) is accomplished by suction applied through the outlet opening (34) or by a jet or puff of pressurized cleaning air delivered into the inspection chamber (31). 10
20. The method according to claim 18 or 19, wherein the outlet opening (34) is subjected to at least one open/close cycle between the step of analysing the air flow from one article (100) and the step of analysing the air flow from the next article (100). 15
21. The method according to claim 20, when dependent on claim 18 or 19, wherein the outlet opening (34) is kept open at least during the generation of the jet or puff of air, and is kept closed during at least part of the detecting process performed by the olfactory sensor (33). 20
22. The method according to any one of claims 15 to 21, wherein opening and closing the inlet opening (32) and/or the outlet opening (34) is synchronized, in particular automatically and/or mechanically by rotating the drum (10) in such a way that the rate at which they open and close is the same as the rate at which the successive articles (100) pass through on the drum (10). 25 30
23. The method according to any one of claims 15 to 22, wherein opening and closing the inlet opening (32) and/or the outlet opening (34) is controlled electronically, in particular through controllable valves. 35
24. The method according to any one of claims 15 to 23, wherein each article (100) is held securely at its ends (101, 102), at least in the inspection area, by a pair of opposing pads movable around the axis of rotation of the drum (10) and synchronized with the drum (10), the pads gradually engaging the ends of the article (100) as it approaches the inspection area and gradually disengaging the ends of the article (100) as it moves away from the inspection area, each pad having a through duct (41) and the through ducts (41) of each pair being aligned with each other and positioned, when in the inspection area, to be aligned with the blowing device (32) and with the detector (31). 40 45 50

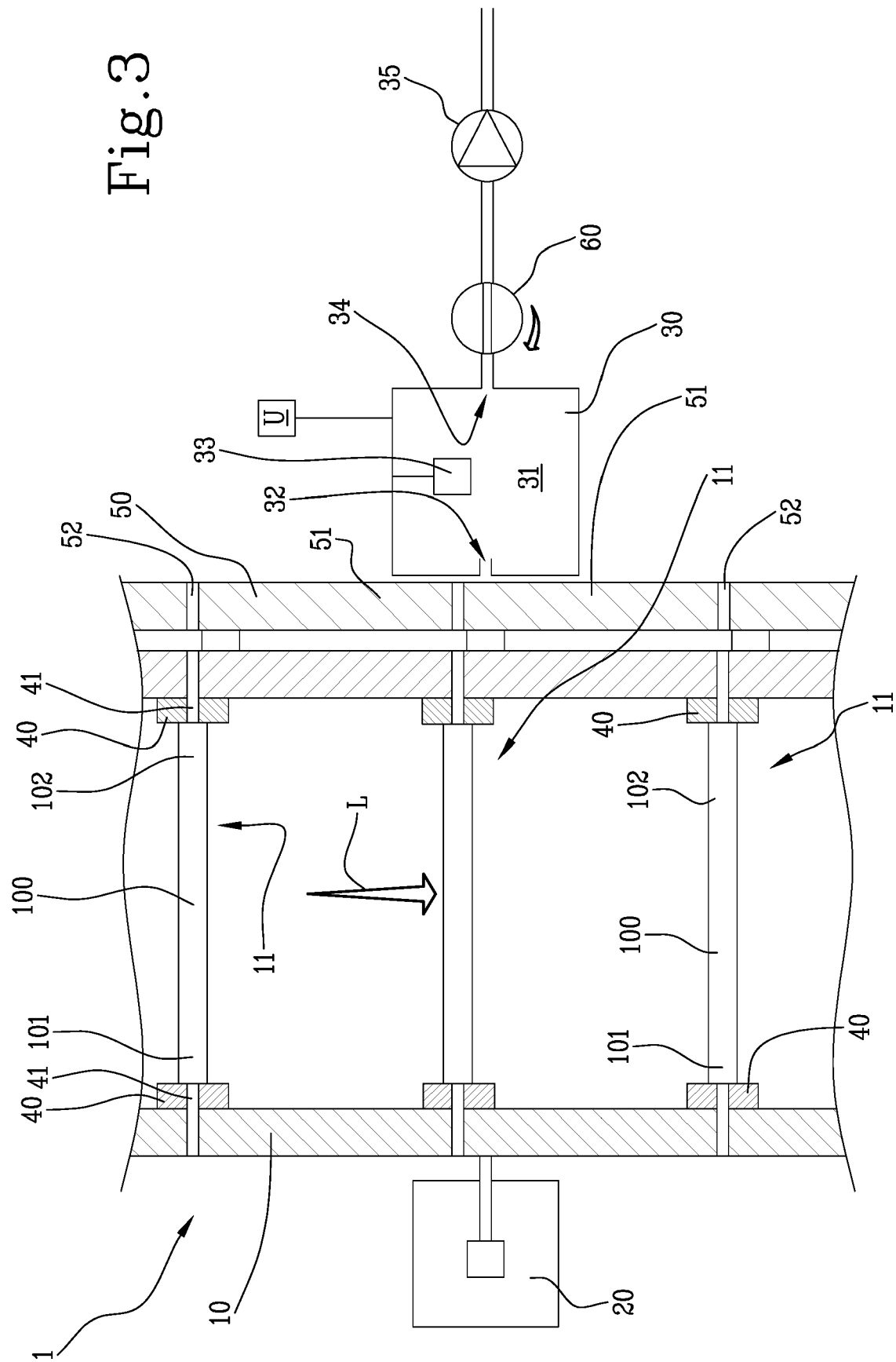
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Fig. 1



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EUROPEAN SEARCH REPORT

Application Number

EP 24 17 5015

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 2016/107780 A1 (JT INT SA [CH]) 7 July 2016 (2016-07-07) * page 2, line 23 - page 3, line 1; claims; figures * * page 7, line 30 - page 8, line 3 * * page 8, line 24 - line 31 * * page 12, line 28 - page 13, line 1 * -----	1-24	INV. A24C5/34 ADD. A24D3/06
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			TECHNICAL FIELDS SEARCHED (IPC)
			A24C A24B A24D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 10 October 2024	Examiner Marzano Monterosso
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 24 17 5015

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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